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thing may be said of the *satisfaction* of interest. With regard to the latter, however, the term "approval" seems to be out of place. We "approve" that which is good in the moral sphere, but the satisfaction of desire consists rather in the *use* of the desirable object, just as the satisfaction of curiosity consists in belief in what is true, and the satisfaction of liking in the enjoyment of what is pleasant.

No part of Dr. Montague's paper is concerned with evaluation in the ideal realm, nor shall I attempt an analysis myself any further than has already been done in my former article. I am here not so much interested, indeed, either in the criticism of Dr. Montague's presentation, or even in the presentation of a constructive scheme myself, as in pointing out the specific agreements and differences between us.

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CONCEPTS AND EXISTENCE

THE interesting discussion between Professor Bush and Professor Pitkin that has been carried on in this JOURNAL[1] seems to suffer from an overlooked ambiguity in the fundamental idea in question—that of the straight line. The term straight line is actually used in three meanings which might be described as physical, mechanical, and geometrical, and the problem of the relation of concept and existence might be stated with respect to any or all of these meanings. There is also the further problem of the identity of the three things conceived by virtue of which they are all straight lines. Professor Pitkin is primarily interested in the physical line and its concept, which he identifies with the geometrical line; Professor Bush (p. 690) uses the mechanical conception, the railway curve as the plan of an engineer, but has shifted from the geometrical conception by which "the line *is* the definition" (p. 688). Undoubtedly these three conceptions and the entities relative to them have been differentiated "after many years of highly expert use" (p. 690) of concepts and things and are really different, although they have a fundamental identity. It is important, then, that they be kept apart.

Professor Hilbert begins his "Grundlagen der Geometrie" with an assumption of three different systems of things (*Dinge*) (p. 5). It makes no difference what the things are provided they conform to

[1] (1) "The Empirical Status of Geometrical Entities," W. B. Pitkin, this JOURNAL, Vol. X., pages 393–402; (2) "Concepts and Existence," W. T. Bush, Vol. X., pages 686–690; (3) "Concepts and Existence," W. B. Pitkin, Vol. XI., pages 131–133.

certain postulated demands. The line is simply a particular class of things in the first system. The postulates defining it do not even demand concrete relations between them, but only types of relation, asymmetrical and transitive, conforming to certain ordinal requirements. They could just as well be exemplified by a collection of debtors and creditors properly restricted as to financial arrangements, or by a collection of numbers, as by points. Their straightness, even, is merely a requirement as to relations within the systems. The line that is straight in an Euclidean system is a curve in such a system as Riemann's, and *vice versa.* The limitation to relational types, however, is important, for thereby the applicability of the system is extended to arithmetic and other branches of mathematics wherein the types are exemplified and which consequently stand to it as objects through which its results may be tested and their consistency established.[2] Here is one instance of a line concept and an object conceived.

The great peculiarity of mathematics, not of geometry alone, is that it has no further use for entities of any sort than as terms to connect by types of relations. Its objects are merely focal points in a system of relational types and are irrelevant to mathematics in so far as they are thought of as anything more than occupying a place in such a system. In the physical universe things determine, if they do not constitute, their relations; in pure mathematics, on the other hand, entities are constituted by their relations, in so far as they enter its domain. It is this fact that justifies Professor Bush in asserting (p. 688) that "the line *is* the definition," and Professor Pitkin's criticism (p. 133) "how can the definition be identical with that which it is to bring into existence?" is only justified by playing back from the geometrical line to the mechanical or physical line.

The peculiar value of mathematics lies in the fact that the asymmetrical and transitive relational types and ordinal properties studied by it are so profusely illustrated in the physical universe, and on this account it has been developed. The mechanical and the physical line retain these geometrical characteristics and hence arises their diagrammatic and practical utility. They *are* the geometrical line, but they are each also something more. It is not quite true that "the definition, in so far as it is a pragmatic entity, is related to the straight line precisely as the recipe of a cake is related to the cake" (p. 133) *if* the definition is geometrical, and the line understood in the mechanical or physical sense, for the cake recipe prescribes not only the proportions, but also the ingredients themselves, whereas the geometer's definition only lays down the relations of the ingredients. The engineer's plan, however, is a true recipe for the railway, for in it are specified both the ingredients and their relations, but the geometer's definition is hardly a true recipe for a geometrically linear entity.

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[2] *Cf.* Hilbert, *loc. cit.,* Kap. II.

Why Professor Pitkin feels that from the fact that the cake is not the recipe, it must follow "that the relation between formula and thing to be made has nothing to do with the relation between universal and particular" (p. 133) I do not quite understand. The universal, if it has any meaning at all, is surely primarily an instrument for handling a situation. The most refined form of mathematics is nothing but the result of isolating significant aspects of things because of the fruitfulness of those aspects in handling some class of facts, and this selection is from what is given for the sake of what can be done with it. Professor Pitkin's realism should have taught him that the recipe *is* the cake, only the cake is much more than the recipe, just as the geometrical line is the experienced line, only the experienced line is much more that the geometrical line. The latter fact he fully recognizes in criticizing Pearson. Recipe, formula, and universal express limitations under which a thing exists and the distinction, if it is to be made at all, must be based merely on the degree of adequacy with which those limitations are formulated, but not even the most careful recipe approaches the complexity of concrete actuality, as every amateur cook can testify.

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REVIEWS AND ABSTRACTS OF LITERATURE

La Psychologie Objective. W. BECHTEREW. (Translated from the Russian by N. KOSTYLEFF.) Paris: Alcan. 1913. Pp. 478.

The growing tendency to explain mental life in motor, rather than in sensory, terms is fully embodied in the present work. The definition of psychology as "a description and explanation of states of consciousness" is rejected at the outset. Instead of studying sensations, images, or ideas Professor Bechterew would have us study processes of stimulation and response, neural traces and the association of these traces with new experience, and the determination of the nature of reactions in consequence of the attendant circumstances. Instead of states of consciousness the term "neuro-psychic process" is suggested in the hope of doing away with the contrast between the physical and the psychical. Every neuro-psychic act is reduced to the scheme of the reflex. Under the name "reflexology" objective psychology is said to be a branch of biology. Wherever a reaction is modified by individual experience, we have a psycho-reflex or a neuro-psychic phenomenon in the proper sense of the term. From the above it is clear that although Professor Bechterew regards himself as a behaviorist, he would not limit himself to the study of